ISSN No. 2456-4400
Int J Med Lab Res 2025, 10(1), 32-40

IJMLR International Journal of Medical Laboratory Research

RESEARCH ARTICLE

CORRELATION OF SERUM LEPTIN, BMI AND BLOOD PRESSURE MEASUREMENTS OF WOMEN TRADERS IN CREEK ROAD MARKET, PORT HARCOUT, NIGERIA

HA Waribo[1], MH Igoh [2], KN Elechi-Amadi[3], E Ibioku[4]

[1]*Associate Professor, Faculty of Medical Laboratory Science. Rivers State University, Nkpolu-Oroworukwo, P.M.B.5080, Port Harcourt, Rivers State, Nigeria.*
[2] *Post Graduate student, Faculty of Medical Laboratory Science. Rivers State University, Nkpolu-Oroworukwo, PMB.5080, Port Harcourt, Rivers State, Nigeria.*
[3] *Senior Lecturer, Faculty of Medical Laboratory Science. Rivers State University, Nkpolu-Oroworukwo, PMB.5080, Port Harcourt, Rivers State, Nigeria.*
[4] *Associate Professor, Faculty of Medical Laboratory Science. Rivers State University, Nkpolu-Oroworukwo, PMB.5080, Port Harcourt, Rivers State, Nigeria.*

Received: 02 February, 2025 /Revision: 24 February, 2025 /Accepted: 03 April, 2025

ABSTRACT: Background: Leptin is required to maintain normal body weight, as it lowers food intake and increases energy expenditure. With the rising prevalence of obesity and cardiovascular diseases, understanding the relationship between leptin, BMI, and blood pressure is crucial for targeted public health interventions in women traders. **Method:** The cross-sectional study involved 150 women traders within the age bracket of 20 and 60years. Blood pressure measurements were done using standard mercury sphygmomanometer. Blood sample was taken for analysis of serum leptin using an enzyme linked immunosorbent assay (ELISA) method while the BMI was calculated from the weight and height measurements of these subjects. **Results:** The results indicated a significant positive correlation between serum leptin levels and BMI ($R^2 = 0.5707$, $p < 0.001$) and a positive correlation with waist hip ratio (WHR) 0f $R^2 = 0.1291$, $p < 0.001$, suggesting that higher adiposity is associated with increased leptin concentrations. Additionally, a significant correlation was observed between serum leptin, systolic blood pressure ($R^2 = 0.2114$, $p < 0.001$) and diastolic pressure ($R^2 = 0.16$, $p < 0.001$) implying that blood pressure increases with the levels of leptin. However, in this study, the mean SP (117.67±12.35mmHg), DP (79.07±5.58mmHg) and leptin (3.56±0.93ng/ml) were within reference range. **Conclusion:** These observations highlight the potential role of leptin as a contributory factor for developing obesity and some related hypertensive complications which might lead to health implications. The study underscores the need for targeted interventions among women traders in Port Harcourt. It is therefore recommended that these parameters be monitored regularly as part of the assessment of health status to avoid incidence of obesity related complications resulting from the sedentary lifestyles. It also can aid in early identification of at-risk individuals among the market women.

Keywords: Leptin, Blood Pressure, Body Mass Index, obesity, hypertension, Women traders, Creek Road Market, Port Harcourt.

Corresponding Author:
Dr Helen A. Waribo,
Associate Professor,
Faculty of Medical Laboratory Science. Rivers State University, Nkpolu-Oroworukwo, P.M.B.5080, Port Harcourt, Rivers State, Nigeria.
Email- helen.waribo1@ust.edu.ng

INTRODUCTION:

leptin is a poly peptide hormone secreted in concentrations proportional to body fat mass playing an important role in several physiological functions like energy homeostasis, immunity, and reproduction, with possible implications in other conditions [1]. Leptin is required to maintain normal body weight, as it lowers food intake and increases energy expenditure [2]. Leptin mediates the increase in blood pressure associated with obesity [3]. It is well recognized that an increased body weight is often associated with metabolic disorders (hyperinsulinaemia and glucose intolerance), as well as increased blood pressure. Hypertension, also known as raised blood pressure, is a condition in which the blood vessels have persistently raised pressure. This blood pressure is created by the force of blood pushing against the walls of the blood vessels (arteries) as the heart pumps. The higher the pressure, the harder the heart has to pump. Hypertension is a serious medical condition that significantly increases the risks of heart, brain, visual impairment, kidney and other diseases [4]. It has been estimated that 1.28 billion adults aged 30-79 years worldwide have hypertension, mostly (two-thirds) of those living in low- and middle-income countries. It is a major cause of premature death worldwide. On the other hand, indeed, obesity activates both the sympathetic nervous and renin–angiotensin systems and causes insulin resistance and hyperinsulinemia, all of which have been thought to raise blood pressure [5,6]. Majority of women selling in the market have been observed to have sedentary lifestyles [7] which further complicates some metabolic issues in the body like hypertension and obesity. One of the global targets for non-communicable diseases is to reduce the prevalence of hypertension by 33% between 2010 and 2030[8]. The association between obesity and hypertension suggests that the adipose mass may serve as an important tissue in the regulation of blood pressure [9]. Hence this study to measure and correlate the levels of leptin, obesity expressed as body mass index (BMI) and blood pressure in women traders in creek road market so as to identify quickly those at risk of these metabolic disorders

MATERIALS AND METHODS:

Research Design

The research is a cross-sectional study involving 150 apparently healthy market women within the age range of 20 to 60 years, resident in Port Harcourt who are traders in creek road market, Nigeria.

Ethical Approval

Ethical approval was obtained with Ref No.RSHMB/RSHREC 2022/030 of the Rivers State Health Management Board. Data were collected through structured questionnaires, anthropometric measurement and laboratory tests.

Informed Consent Statement: Informed consent was obtained from all subjects involved
in the study.

Study Area

The sample was taken women traders from Creek Road Market, Borokiri, Port Harcourt Local Government Area of Rivers State. Nigeria.

Sample size

Sample size was determined using G Power 3.1.9.2, at power of 0.8, effect size 0.5 and alpha 62 error probability of 0.05. Total sample size was 128, but this study adopted a sample size of 150.

Inclusion Criteria

Apparently healthy female Nigerians, resident in Port Harcourt, who are within the ages of 20 and 60 years, traders in the creek road market who gave their consent to participate in this study were included for the study.

Exclusion Criteria

Subjects who were unwilling to participate in the study, Pregnant women, those with acute febrile illness in the week preceding commencement of the study. Subjects who were known or suspected to have chronic debilitating diseases such as chronic heart failure and malignancy, or any other chronic health condition.

Subjects who were on prescribed medications at the time of this study.

Blood Pressure Measurement

Brachial blood pressure measurements were taken by auscultatory method using standard mercury sphygmomanometer with appropriate cuff size (cuff bladder encircling at least 80 percent of the arm) for all subjects after five minutes rest in a sitting and a relaxed position [10].

Reagents

Human LEP(Leptin) ELISA kit manufactured by ELKbiotech, Denver, USA. Lot: 20365084741, Expiry Date: 30.11.2024, Mindray MR96A.

Sample Collection

3 mls of venous blood sample under aseptic procedure from the cubital fossa of each subject after an overnight fast of at least 8 hours was taken into a plain specimen bottle. The specimen in the plain bottle was allowed to clot and thereafter centrifuged at 3000 revolution per minute for 5 minutes to extract the serum into another set of plain specimen bottles which were ready for analysis for serum leptin using an enzyme linked immunosorbent assay (ELISA) method. The test was carried out and interpreted according to the manufacturer's instructions.

Measurement of Height (H) as describe by Ononamadu,[11].

Height in meters (m) were measured in subjects without wearing head gear and shoes in erect position against a graduated height scale (Seca stadiometer) to the nearest 0.5 centimeters (cm).

Measurement of Weight (W) as described Lee *et al.* [12]

Weight was measured with subjects in light clothing and shoes off to the nearest 0.1 kilogram (kg) using a standardized weighing scale (Seca weighing scale) placed on an even horizontal hard surface.

Measurement of Body Mass Index (BMI) as described by Ononamadu.[11]

Body mass index (kg/m^2) was calculated as the weight of subject in kilogram divided by square height of the same subject in meters and recorded in kilogram per square meter (Kg/m^2).

Measurement of Waist Circumference (WC) as described by WHO [13]

This was measured to the nearest 0.1 cm using a flexible non stretch measuring tape at a point halfway between the lower margin of the lowest palpable rib and the top of iliac crest with the tape parallel to the floor. The subject stood in relaxed position with feet close together, arms at the side and body weight evenly distributed and the measurements were taken at the end of a normal expiration.

Measurement of Hip Circumference (HC) as described by WHO [13]

This was measured to the nearest 0.1 cm using a flexible non stretch measuring tape at a point around the widest portion of the buttocks (point of maximum extension of the buttock) with the tape parallel to the floor. The subject stood in relaxed position with feet apposed together, arms at the side and body weight evenly distributed.

Measurement of Waist to Hip Ratio (WHR) as described by Lee *et al.*[12]

This was calculated by dividing the measured waist circumference of a subject by the measured hip circumference of the same subject.

Statistical Analysis

The data generated were analyzed using Statistical Package for Social Sciences (SPSS) version 25 (SPSS Inc. Chicago Illinois). Results were expressed as mean ± standard deviation (SD). It was presented in tables and figures as appropriate. p-values less than or equal to 0.05, was considered statistically significant. Correlation plots was carried out using Pearson's correlation coefficient, with p-values < 0.05 considered statistically significant.

RESULTS:

Demographic Characteristics of Subjects

The demographic data collated indicated a significant difference between the age interval of subjects (p=0.131). There was significant difference in tribe, with Ijaw tribe having the highest frequency of 85. There was significant difference in the level of education of subjects as seen in the **Table 1** as very few subjects have attained tertiary education. There was significant difference in the income status of subjects (p=<0.001). There was significant difference in marital status of subjects (p= 0.033).

Table 1: Demographic Characteristics of Subjects

Subjects	Frequency	Prevalence	p-value	X^2-value
Age Interval				
a. 20 - 29	15	10	0.131	5.311
b. 30 – 39	25	17		
c. 40 – 49	49	51		
d. 50 - 59	33	22		
Tribe				
a. Ijaw	85	57	0.033	8.522
b. Ikwerre	42	28		
c. Ogoni/Eleme	05	03		
d. Igbo	18	12		
Occupation				
a. Business/Traders	150	100	-	-
Level of Education				
a. Primary	78	52	0.013	5.443
b. Secondary	55	37		
c. Tertiary	10	07		
d. None	07	04		
Religion				
a. Christianity	145	97	<0.001	10.153
b. Islam	05	03		
Income Status				
a. Low	140	94	<0.001	9.903
b. Middle	10	06		
c. Upper	0	-		
Marital Status				
a. Single	20	30	0.033	8.522
b. Married	87	58		
c. Divorced	25	17		
d. Widowed	18	12		
Parity				
a. Nullipara	21	14	0.001	5.443
b. Multipara	92	61		
c. Primipara	37	25		

Distribution of blood pressure ranges in the market Women.

More women showed a higher blood pressure in the study population compared to the reference range which is showed in **Table 2**

Table 2: Blood Pressure Distribution among the Women traders.

Parameter	Number	p-value	X2-value
Diastolic Pressure (mmHg)			
<80	61	0.012	3.227
80 & above	89		
Systolic Pressure (mmHg)			
<120	61	0.022	5.227
120 & above	89		

Results of the Mean levels of various parameters in the Women Traders

The mean values of Body Mass Index, Waist-to-Hip Ratio, Leptin, Systolic Pressure (mmHg) and Diastolic Pressure (mmHg) among the subjects were 28.72±10.31Kg/m^2, 0.83±0.22, 3.56±0.93ng/ml, 117.67 ± 12.36 and 79.07 ± 5.58 respectively. Waist Circumference and Hip Circumference results were 94.40±8.05cm and .113.96±5.38cm respectively. This is shown in **Table 3**.

Table 3: Mean ± SD of Parameters among Subjects

Parameter	Mean SD	Reference Value
Body Mass Index (kg/m2)	28.72 ± 10.31	18.5-24.9
Waist-to-hip ratio	0.83 ± 0.22	<0.81
Leptin (ng/ml)	3.56 ± 0.93	0.5-15.5
Diastolic Pressure (mmHg)	79.07 ± 5.58	<80
Systolic Pressure (mmHg)	117.67 ± 12.36	<120
Waist Circumference	94.40 ± 8.05	≤88cm
Hip Circumference	113.96 ± 5.38	≤48cm

Comparison of Parameters according to Age Groups

The leptin levels (ng/ml) for subjects in the different age ranges were 2.19±0.96, 2.84±1.00, 4.03±5.15, and 4.81±2.67 respectively. There was a significant difference in the leptin levels (p<0.001). The diastolic pressure (mmHg) for the subjects in the different age ranges were 76.65±8.15, 77.26±8.52, 82.41±8.02, and 84.73±8.16. There was a significant difference in the diastolic pressure (p=0.013). The systolic pressure (mmHg) for subjects in the different age ranges were 114.45±9.25, 117.90±10.74, 116.94±14.73 and 123.82±10.60 respectively. There was a significant difference in the systolic pressure (p=0.018). The BMI for subjects within age ranges (years) of 20-29, 30-39, 40-49, 50-59, were 24.41±3.52, 27.52±3.46, 33.29±5.31, 33.75±2.71 respectively. There was a significant difference in BMI (p<0.001). The WHR for the age ranges were 0.82±0.03, 0.82±0.03, 0.85±0.03, 0.85±0.02 respectively. There was a significant difference in WHR (p<0.001). All these are shown in **Table 4**.

Table 4: Comparison of Parameters according to Age Groups.

	BMI (kg/m2)	WHR	Leptin (ng/ml)	DP (mmHg)	SP (mmHg)
A(20-29)	24.41 ± 3.52[a]	0.82 ± 0.03[a]	2.19 ±0.96[a]	76.65 ± 8.15[a]	114.45 ± 9.25[a]
B(30-39)	27.52 ± 3.46[b]	0.82 ± 0.03[a]	2.84 ±1.00[a]	77.26 ± 8.52[a]	117.90 ± 10.74[a]
C(40-49)	33.29 ± 5.31c	0.85 ± 0.03[b]	4.03 ±5.15[b]	82.41 ± 8.02[b]	116.94 ± 14.73[a]
D(50-59)	33.75 ± 2.71c	0.85 ± 0.02[b]	4.81 ±2.67[b]	84.73 ± 8.16[b]	123.82 ± 10.60[b]
p-value	<0.001	<0.001	<0.001	0.013	0.018
F-value	24.169	8.415	8.989	3.809	9.654
Remarks	S	S	S	S	S

Values with different superscripts are significantly different from each other (p≤0.05)

Correlation of leptin with blood pressure

There is a positive correlation between leptin and the blood pressures as shown on **figure 1 and 2**.

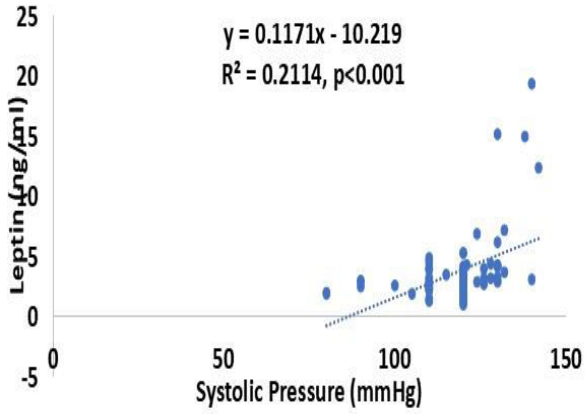

Figure 1: Correlation plot of leptin levels with Systolic pressure levels

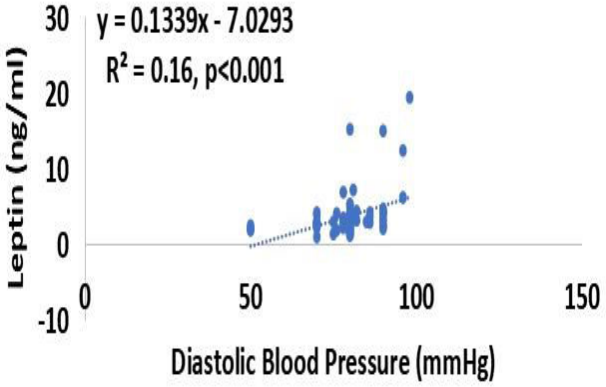

Figure 2: Correlation plot of leptin levels with Diastolic pressure levels.

Results of Anthropometric Parameters among the Subjects

The number of subjects with BMI of 18.5-24.9 (normal weight), 25-29.9 (overweight) and 30 & above (obese) were 39, 50 and 61. There was no significant difference in the number of subjects (p=0.089). The number of subjects with waist-to-hip ratio of <0.81 and 0.81 and above were 55 and 95 respectively. There was a significant difference in the number of subjects (p=0.0010). The waist circumference of subject <88cm and >88cm were 63 and 87 respectively. There was significant difference in number of subject (p=0.021). The hip circumference of subjects <98cm and <98cm were 5 and 145 respectively. There was a significant

difference in the number of subjects (p=0.001). This is shown in **Table 5**.

Table 5: Comparison of Anthropometric Parameters among the Subjects

Anthropometric Parameter	Number	Prevalence	p-value	X^2-value	Remark
Body Mass Index (kg/m²)					
<18.5	-				
18.5-24.9	39	26	0.089	4.840	NS
25-29.9	50	33			
30 & above	61	41			
Waist Circumference					
≤ 88	63	42	0.021	4.443	S
> 88	87	58			
Hip Circumference					
≤ 78	5	3	0.001	6.931	S
> 98	145	97			
Waist-to-hip ratio					
<0.81	55	37	0.001	10.667	S
0.81 & above	95	63			

Correlation between Leptin and anthropometric parameters

There is a positive correlation between leptin and BMI, WHR are shown on **Figure 3 and 4**.

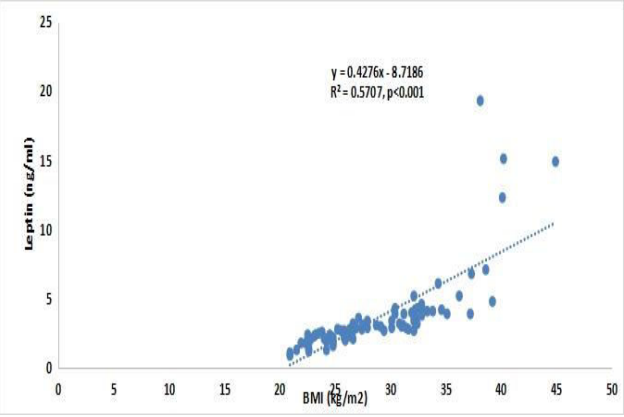

Figure 3: Correlation Plot of Leptin versus BMI

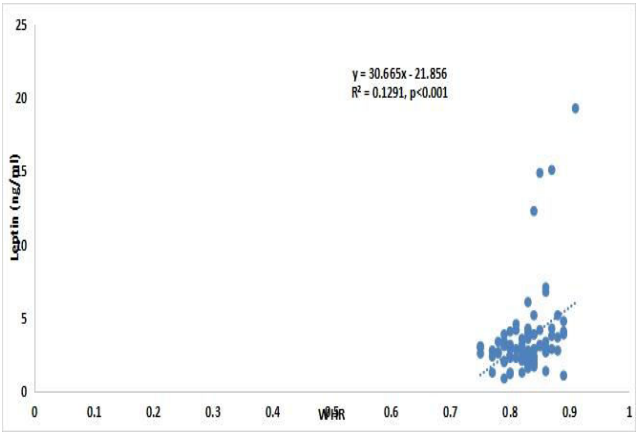

Figure 4: Correlation Plot of Leptin versus WHR

DISCUSSION:

The study shows that the number of subjects with diastolic pressure DP (p=0.012) and systolic pressure SP (p=0.022) higher than the reference standard was significantly more than the number of those within the blood pressure range as seen in the distribution chart (**Table 2**) .Meanwhile, the results from the study shows that leptin levels in the population were relatively within the reference ranges (0.5-15.5ng/ml) (**Table 3**) .this is in contrast with the study where female known hypertensive had high leptin values [14]. However, a study by Bravo et al. [5] revealed that leptin levels relate with blood pressure through the renal sympathetic activation. This study corroborates the study by Ma et al. [15] in revealing the association of leptin with blood pressure in women. Hypertension has been linked with body mass index and unhealthy diets[16]. Thus, increase in the body mass index can lead to increase in blood pressure [17] which correlates with the observation in this study as regards the BMI values. It was also observed that majority of the women were classified as overweight or obese based on their BMI, the BMI and WHR also increased as the ages increase (**Table 3 and 4 respectively**). Other associated factors for hypertension in women might include increasing age, use of tobacco, living in urban area, alcohol consumption, and non-vegetarian diet [18,19]. This might account for the observed raised blood pressure in a significant majority of the subjects as observed in the study. The blood pressure values were at upper

borderline levels for women in the age range of 50-59. This might be attributed to the poor life style characteristics among market women relating this to their level of literacy as showed in the demographic chart. The results from this study indicate that the mean values of leptin and blood pressure significantly increased with age. This may be due to physiological weight gain that result from increase in body fat [20]. This finding agrees with the report of Xie [21], which stated that body weight of women increases with age, and this weight gain might have led or contributed metabolically to the increased blood pressure. Also, studies have showed that Obesity and hyperinsulinism are major stimulators of leptin production, and this production is strongly and positively correlated with body fat mass [22] which might be implicated in most market women as implicated in the correlation plot of leptin with BMI and WHR. This can also be adduced to the sedentary life of most market women of sitting at a position for a longer period all day with less bodily exercises resulting to continued weight gain and associated metabolic disorder [15, 23]. The result in this study shows a positive correlation between leptin and blood pressure. This implies that blood pressure increases with the levels of leptin. This agrees with the study by Bełtowski,[24] that leptin has a positive correlation with blood pressure. Leptin is able to stimulate the sympathetic nervous system which will lead to an increased vascular resistance and further an elevated blood pressure [25]. Lifestyle factors, genetic and hormonal changes and compensatory mechanisms within the system of some of the women could be adduced to the observations seen in some subjects having higher leptin levels despite blood pressures within the reference ranges [26]. The study also confirms the variabilities in these indices in regards to Sex as a factor as presented in a study that presents significant variations for BP and serum leptin levels, and a significant positive linear association among serum leptin, body mass index and blood pressure in males [27].

CONCLUSION:

This study underscores the importance of evaluating serum leptin levels alongside BMI and blood pressure in women traders. Advocacy on healthy eating habits, nutritional education and support and stress management techniques be carried out. Promotion of physical activities and exercise be encouraged to avoid sedentary lifestyles that might cause metabolic disturbances/ disorders which might lead to increased blood pressure and tendency to developing obesity,

REFERENCES:

[1]. Cernea S, Roiban AL, Both E, Huţanu A. Serum leptin and leptin resistance correlations with NAFLD in patients with type 2 diabetes. Diabetes Metab Res Rev. 2018;34(8):3050-3055.

[2]. Ramos-Lobo AM, Donato JJ. The role of leptin in health and disease. Temperature (Austin). 2017;4(3):258-291.

[3]. Stenvinkel P. Leptin and blood pressure—is there a link? Nephrol Dial Transplant. 2000;15(8):1115–1117.

[4]. Onwuli DO, Waribo HA, Anyalebechi EO, Nwafor LU. Evaluation of plasma homocysteine levels in type II diabetes and hypertensive patients attending University of Port Harcourt Teaching Hospital, Nigeria. J Biosci Med. 2023;11(5):30-39.

[5]. Bravo PE, Morse S, Borne DM, Aquilar EA, Reisin E. Leptin and hypertension in obesity. Vasc Health Risk Manag. 2006;2(2):163-169.

[6]. Landsberg L, Aronne LJ, Beilin LJ, Burke V, Igel LI, Lloyd-Jones D, Sowers J. Obesity-related hypertension: pathogenesis, cardiovascular risk, and treatment: a position paper of The Obesity Society and the American Society of Hypertension. J Clin Hypertens (Greenwich). 2013; 15:14–33.

[7]. Appiah-Konadu P, Yekpe C, Adu I, Adu J, Eric A. Sedentary work and incidence of hypertension among market women in Accra-Ghana: a case study of Makola Market women. Resjournali's J Public Health. 2:1-16.

[8]. World Health Organization. Hypertension. 2023. Available at: https://www.who.int/news-room/fact-sheets/detail/hypertension. Accessed 25 Sep 2023.

[9]. Leggio M, Lombardi M, Caldarone E. The relationship between obesity and hypertension: an updated comprehensive overview on vicious twins. Hypertens Res. 2017; 40:947–963.

[10]. Kasper DL, Fauci AS, Hauser SL, Longo DL, Jameson JL, Loscalzo J. Harrison's Principles of Internal Medicine. New York: McGraw-Hill; 2015.

[11]. Ononamadu CJ, Ezekwesili CN, Onyeukwu OF, Umeoguaju UF, Ezeigwe OC, Ihegboro GO. Comparative analysis of anthropometric indices of obesity as correlates and potential predictors of risk for hypertension and prehypertension in a population in Nigeria. Cardiovasc J Afr. 2017;28(2):92–99.

[12]. Lee JW, Lim NK, Back TH, Park SH, Park HY. Anthropometric indices as predictors of hypertension among men and women aged 40–69 years in the Korean population: the Korean genome and epidemiology study. BMC Public Health. 2015; 15:140.

[13]. World Health Organization (WHO). Waist circumference and waist–hip ratio: report of a WHO expert consultation, Geneva, 8–11 December 2008. Geneva: WHO; 2011.

[14]. Waribo HA, Melex TF, Obisike UA, Ibioku E, Onwuli DO. Evaluation of serum leptin levels in diabetic and hypertensive subjects' resident in Port Harcourt. Int J Res Med Sci. 2023;11(10):3630-3635.

[15]. Ma D, Feitosa MF, Wilk JB, Laramie JM, Yu K, Leiendecker-Foster C, et al. Leptin is associated with blood pressure and hypertension in women from the National Heart, Lung, and Blood Institute Family Heart Study. Hypertension. 2009; 53:473-479.

[16]. Nonato IL, Minussi LAO, Pascoal De-Souza GB. Nutritional issues concerning street foods. J Clin Nutr Diet. 2016;2(1):1-9.

[17]. Akinbule OO, Okekhian KL, Omidiran AT, Adenusi SA, Lasabi OT, Oladoyinbo CA. Factors associated with hypertension in women of child-bearing age in Abeokuta. Hum Nutr Metab. 2022; 30:1-7.

[18]. Bhimarasetty MD, Pamarthi K, Kandipudi KLP, Padmasri Y, Nagaraja SB, Khanna P, Goel S. Hypertension among women in reproductive age in India: can we predict the risk? An analysis from National Family Health Survey (2015–2016). J Family Med Prim Care. 2022;11(9):5857-5864.

[19]. Ordinioha B. The prevalence of hypertension and its modifiable risk factors among lecturers of a medical school in Port Harcourt, South-South Nigeria: implications for control effort. Niger J Clin Pract. 2013; 16:1-4.

[20]. Rezende FAC, Ribeiro AQ, Priore SE, Frances Chinni SCC. Anthropometric differences related to genders and age in the elderly. Nutr Hosp. 2015;32(2):757-764.

[21]. Xie YJ, Ho SC, Su X, Liu Z. Changes in body weight from young adulthood to middle age and its association with blood pressure and hypertension: a cross-sectional study in Hong Kong Chinese women. J Am Heart Assoc. 2016;5(1):1-10.

[22]. Obradovic M, Sudar-Milovanovic E, Soskic S, Essack M, Arya S, Stewart AJ, Gojobori T, Isenovic ER. Leptin and obesity: role and clinical implication. Front Endocrinol (Lausanne). 2021; 12:585887.

[23]. Lu SC, Akanji AO. Leptin, obesity, and hypertension: a review of pathogenetic mechanisms. Metab Syndr Relat Disord. 2020;18(9):399-406.

[24]. Bełtowski J. Role of leptin in blood pressure regulation and arterial hypertension. J Hypertens. 2006;24(5):789-801.

[25]. Shankar A, Xiao J. Positive relationship between plasma leptin level and hypertension. Hypertension. 2010;56(4):623-628.

[26]. Lawson EA, Miller KK, Blum JI, Meenaghan E, Misra M, Eddy KT, Herzog DB, Klibanski A. Leptin levels are associated with decreased

depressive symptoms in women across the weight spectrum, independent of body fat. Clin Endocrinol (Oxf). 2012;76(4):520-525.

[27]. Al Aamri S, Serafi AS, Hussain Z, Alrooqi MM, Bafail MA, Sohail S. Blood pressure correlates with serum leptin and body mass index in overweight male Saudi students. J Pers Med. 2023;13(5):828.

Author Contributions: Concept, Design and Protocol writing by Dr Helen A. Waribo, Mr Matthias Igoh wrote the original draft, Dr Kemzi N. Elechi-Amadi carried out the Statistical analysis, Dr Elekima Ibioku did the writing-review and editing.and All Authors did the validation and final proof reading of the manuscript.

Acknowledgments: We acknowledge the staff of Shell RNZ laboratory, Port Harcourt for their assistance and support during the analysis of the samples.

Cite of article: Waribo HA, Igoh MH, Elechi-Amadi KN, Ibioku E. Correlation of serum leptin, BMI and blood pressure measurements of women traders in Creek Road Market, Port Harcourt, Nigeria. Int J Med Lab Res. 2025;10(1):32–40. http://doi.org/10.35503/IJMLR.2025.10106

CONFLICT OF INTEREST: Authors declared no conflict of interest
SOURCE OF FINANCIAL SUPPORT: Nil